MYSTRAN 3D Solid Element Buckling Study

Models are of a 1"x1"x40" Aluminim beam using MYSTRAN solid elements.

Euler Crit. Buckling Load = 1.285105E+03 lb, based on beam theory

HEXA elements (both 8 and 20 node) are all equal sided cubes

HEXA08 Buckling - Mesh Study 2x2x2 reduced integration				
Size	**Mesh**	**MYSTRAN Eigen**	**Method**	**% Error**
1"x1"x40"	1x1x40	1.416631E+03	INV LANCZOS	9.28%
"	2x2x80	1.325014E+03	INV LANCZOS	3.01%
"	4x4x160	1.296666E+03	INV LANCZOS	0.89%
"	8x8x320	1.289053E+03	INV LANCZOS	0.31%
"	10x10x400	1.288137E+03	INV LANCZOS	0.24%

HEXA08 Buckling - Mesh Study 3x3x3 full integration				
Size	**Mesh**	**MYSTRAN Eigen**	**Method**	**% Error**
1"x1"x40"	1x1x40	1.981100E+03	INV LANCZOS	35.13%
"	2x2x80	1.461666E+03	INV LANCZOS	12.08%
"	4x4x160	1.330584E+03	INV LANCZOS	3.42%
"	8x8x320	1.297555E+03	INV LANCZOS	0.96%
"	10x10x400	1.289087E+03	INV LANCZOS	0.31%

HEXA20 Buckling - Mesh Study 3x3x3 REDUCED integration				
Size	**Mesh**	**MYSTRAN Eigen**	**Method**	**% Error**
1"x1"x40"	1x1x40	1.349083E+03	INV LANCZOS	4.74%
"	2x2x80	1.307216E+03	INV LANCZOS	1.69%
"	4x4x160	1.307216E+03	INV LANCZOS	1.69%
"	8x8x320	1.292383E+03	INV LANCZOS	0.56%
"	10x10x400		INV LANCZOS	

HEXA20 Buckling - Mesh Study 3x3x3 full integration				
Size	**Mesh**	**MYSTRAN Eigen**	**Method**	**% Error**
1"x1"x40"	1x1x40	1.320539E+03	INV LANCZOS	2.68%
"	2x2x80	1.292829E+03	INV LANCZOS	0.60%
"	4x4x160	1.278065E+03	INV LANCZOS	-0.55%
"	8x8x320	1.289772E+03	INV LANCZOS	0.36%
"	10x10x400		INV LANCZOS	

MYSTRAN 3D Solid Element Buckling Study

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Euler Crit. Buckling Load = 1.285105E+03 lb, based on beam theory

PENTA elements (both 6 and 15 node) are all equal sided cubes

PENTA06 Buckling - Mesh Study 2x3 reduced integration				
Size	**Mesh**	**MYSTRAN Eigen**	**Method**	**% Error**
1"x1"x40"	1x1x40	1.521343E+03	INV LANCZOS	15.53%
"	2x2x80	1.401103E+03	INV LANCZOS	8.28%
"	4x4x160	1.319949E+03	INV LANCZOS	2.64%
"	8x8x320	1.295388E+03	INV LANCZOS	0.79%
"	10x10x400	1.292226E+03	INV LANCZOS	0.55%

PENTA06 Buckling - Mesh Study 3x7 full integration				
Size	**Mesh**	**MYSTRAN Eigen**	**Method**	**% Error**
1"x1"x40"	1x1x40	4.224469E+03	INV LANCZOS	69.58%
"	2x2x80	1.524799E+03	INV LANCZOS	15.72%
"	4x4x160	1.350903E+03	INV LANCZOS	4.87%
"	8x8x320	1.303139E+03	INV LANCZOS	1.38%
"	10x10x400	1.292226E+03	INV LANCZOS	0.55%

PENTA15 Buckling - Mesh Study3X7 reduced integration				
Size	**Mesh**	**MYSTRAN Eigen**	**Method**	**% Error**
1"x1"x40"	1x1x40	3.350961E+03	INV LANCZOS	61.65%
"	2x2x80	1.299212E+03	INV LANCZOS	1.09%
"	4x4x160	1.287274E+03	INV LANCZOS	0.17%
"	8x8x320	1.285804E+03	INV LANCZOS	0.05%
"	10x10x400		INV LANCZOS	

PENTA15 Buckling - Mesh Study 2x3 full integration				
Size	**Mesh**	**MYSTRAN Eigen**	**Method**	**% Error**
1"x1"x40"	1x1x40	1.272013E+03	INV LANCZOS	-1.03%
"	2x2x80	1.284719E+03	INV LANCZOS	-0.03%
"	4x4x160	1.287274E+03	INV LANCZOS	0.17%
"	8x8x320	1.280372E+03	INV LANCZOS	-0.37%
"	10x10x400		INV LANCZOS	

MYSTRAN 3D Solid Element Buckling Study

Models are of a 1"x1"x40" Aluminim beam using MYSTRAN solid elements.

Euler Crit. Buckling Load = 1.285105E+03 lb, based on beam theory

TETRA elements (both 4 and 10 node) are all equal sided cubes

TETRA04 Buckling - Mesh Study 1pt full integration				
Size	**Mesh**	**MYSTRAN Eigen**	**Method**	**% Error**
1"x1"x40"	1x1x40	4.224469E+03	INV LANCZOS	69.58%
"	2x2x80	1.524799E+03	INV LANCZOS	15.72%
"	4x4x160	1.350903E+03	INV LANCZOS	4.87%
"	8x8x320	1.303139E+03	INV LANCZOS	1.38%
"	10x10x400	1.297191E+03	INV LANCZOS	0.93%

TETRA04 Buckling - Mesh Study 4 pt full integration				
Size	**Mesh**	**MYSTRAN Eigen**	**Method**	**% Error**
1"x1"x40"	1x1x40		INV LANCZOS	
"	2x2x80		INV LANCZOS	
"	4x4x160		INV LANCZOS	
"	8x8x320		INV LANCZOS	
"	10x10x400		INV LANCZOS	

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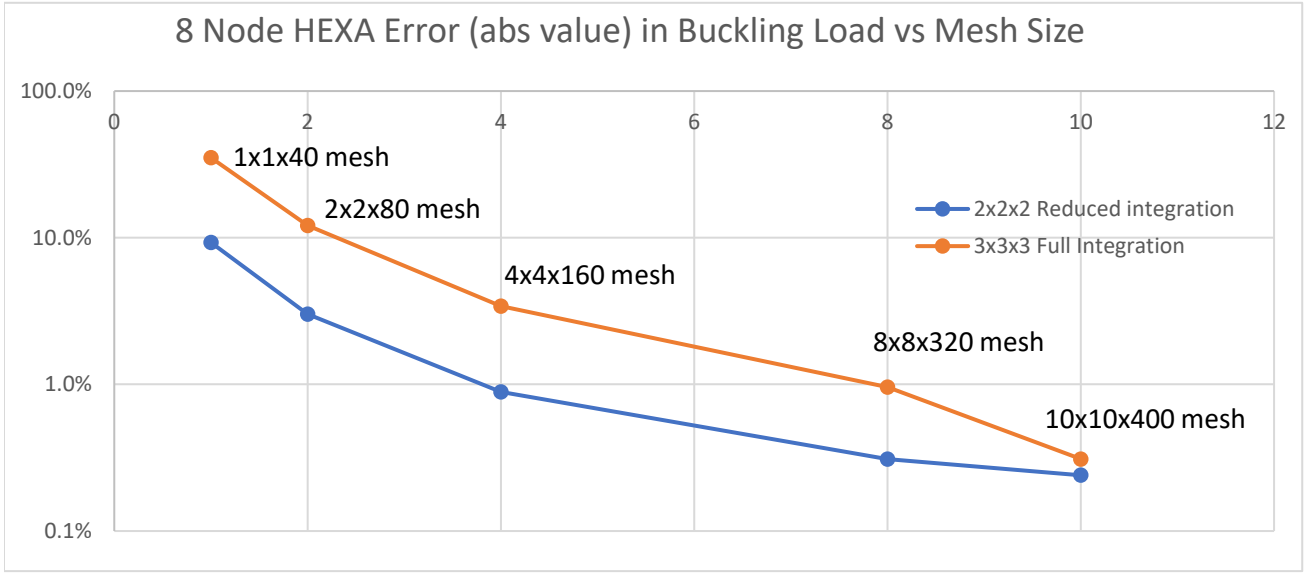
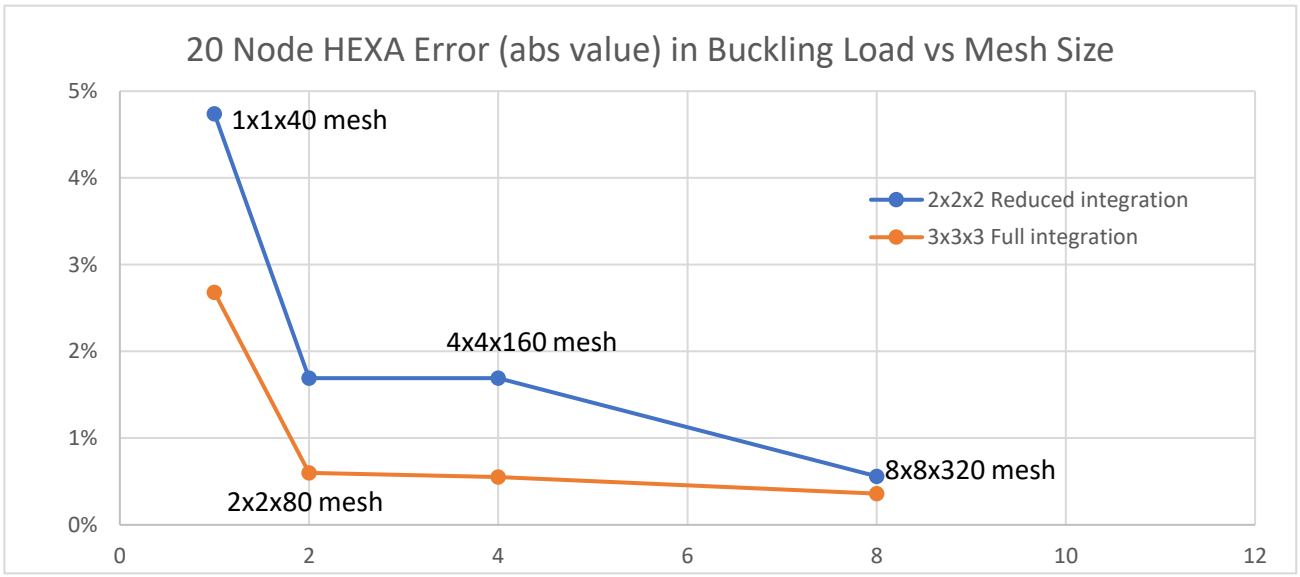
TETRA10 Buckling - Mesh Study 1 pt full integration				
Size	**Mesh**	**MYSTRAN Eigen**	**Method**	**% Error**
1"x1"x40"	1x1x40		INV LANCZOS	
"	2x2x80		INV LANCZOS	
"	4x4x160		INV LANCZOS	
"	8x8x320		INV LANCZOS	
"	10x10x400		INV LANCZOS	

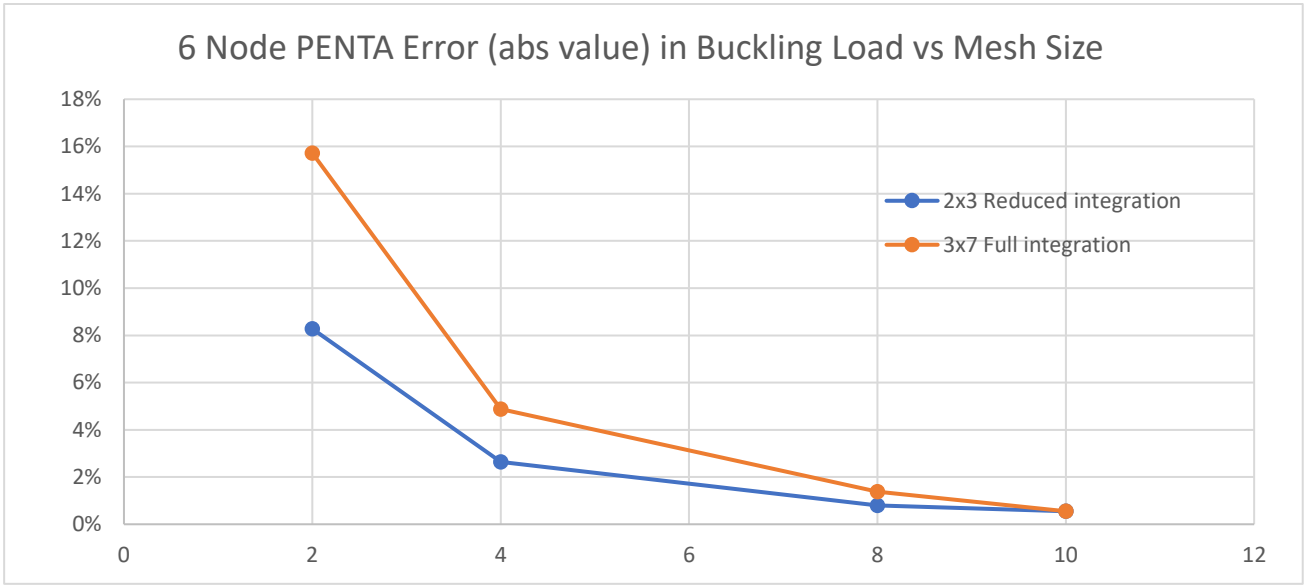
TETRA10 Buckling - Mesh Study 4 pt full integration				
Size	**Mesh**	**MYSTRAN Eigen**	**Method**	**% Error**
1"x1"x40"	1x1x40	7.126515E+04	INV LANCZOS	98.20%
"	2x2x80	1.256695E+03	INV LANCZOS	-2.26%
"	4x4x160	1.267251E+03	INV LANCZOS	-1.41%
"	8x8x320	1.275917E+03	INV LANCZOS	-0.72%
"	10x10x400		INV LANCZOS	



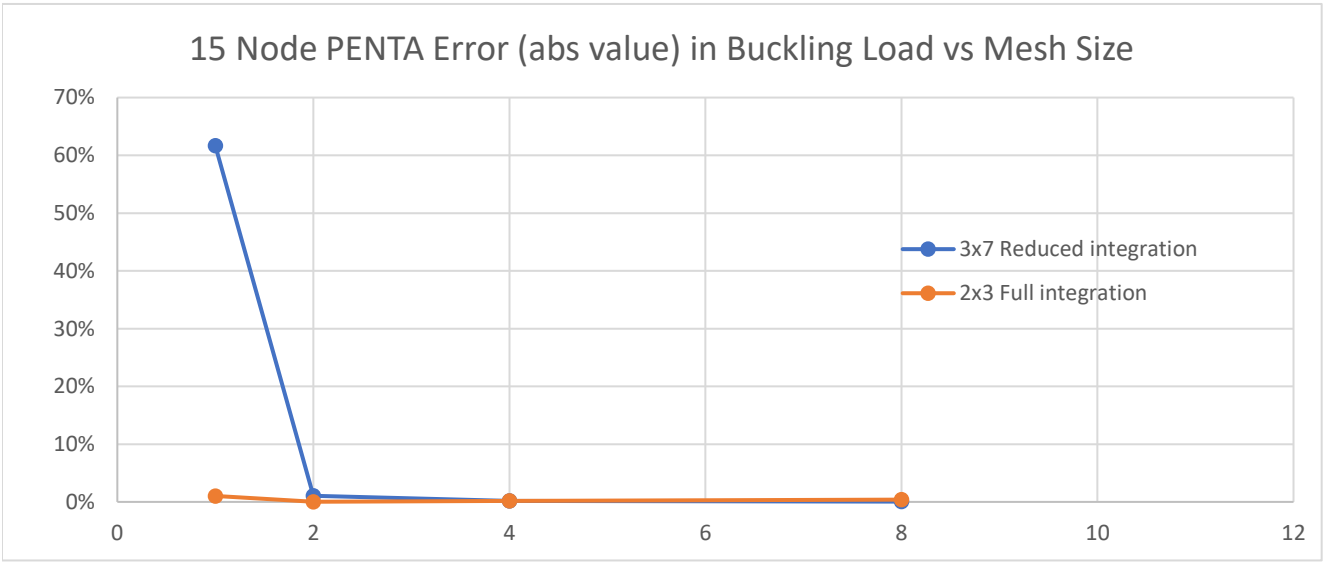
1	9.28%	35.13%
2	3.01%	12.08%
4	0.89%	3.42%
8	0.31%	0.96%
10	0.24%	0.31%



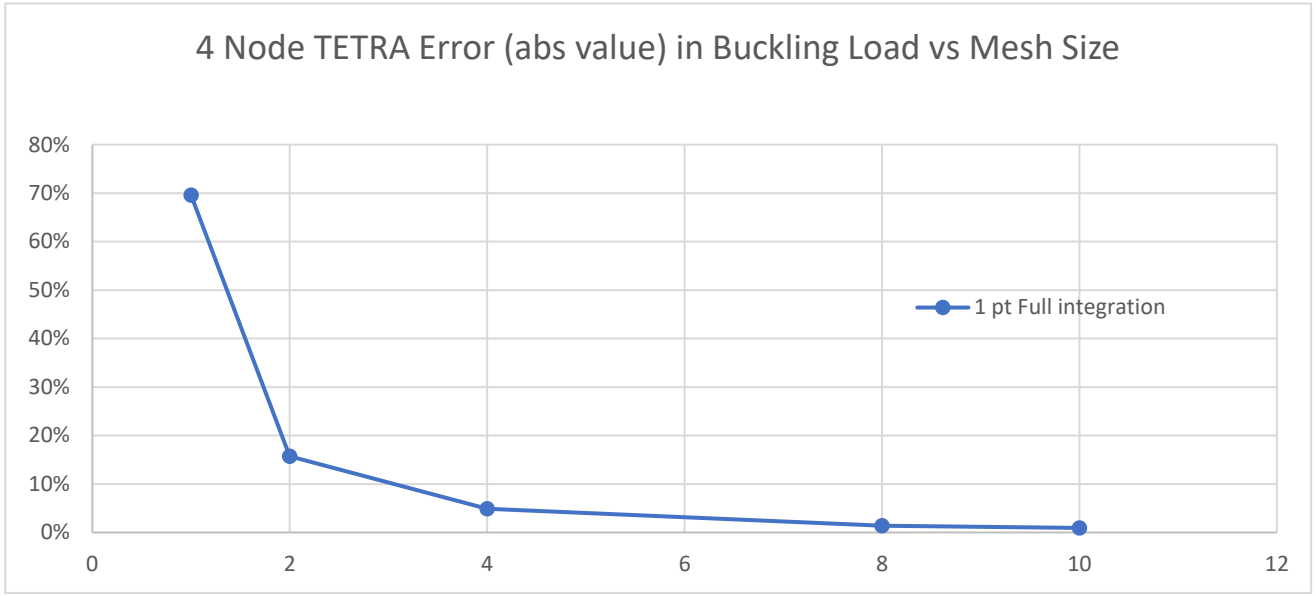
1	4.74%	2.68%
2	1.69%	0.60%
4	1.69%	0.55%
8	0.56%	0.36%



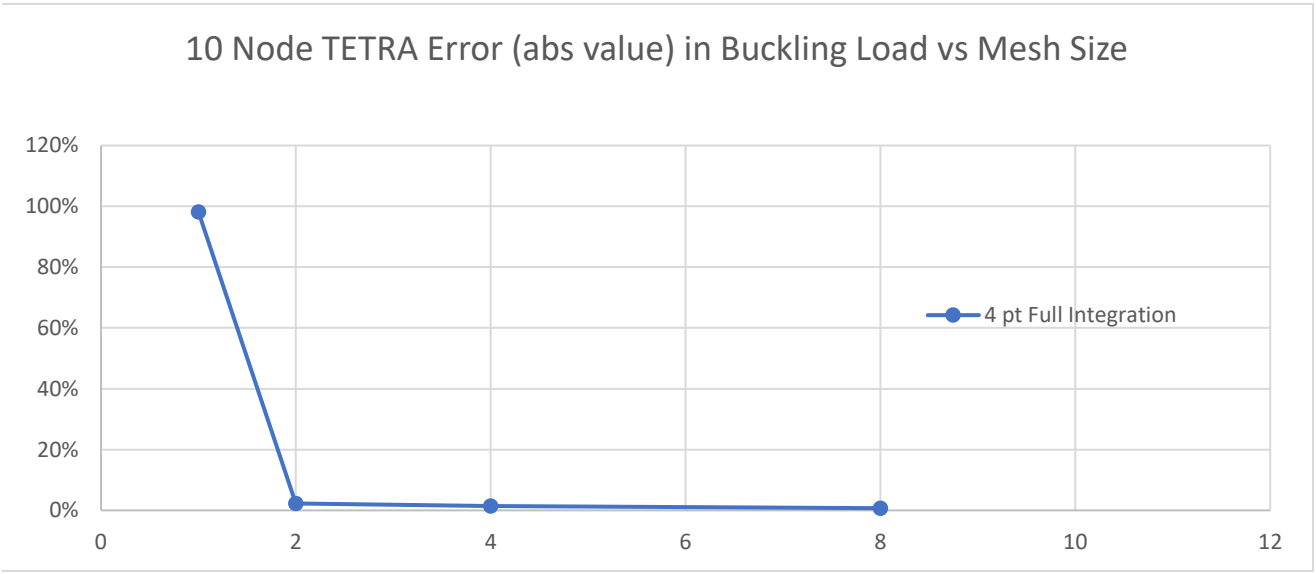
1	15.53%	69.58%
2	8.28%	15.72%
4	2.64%	4.87%
8	0.79%	1.38%
10	0.55%	0.55%



1	61.65%	1.03%
2	1.09%	0.03%
4	0.17%	0.17%
8	0.05%	0.37%
10		



1	69.58%	69.58%
2	15.72%	15.72%
4	4.87%	4.87%
8	1.38%	1.38%
10	0.93%	0.93%



1	98.20%
2	2.26%
4	1.41%
8	0.72%